



Climate Forecasting Unit

Climate Forecasting for Wind Energy

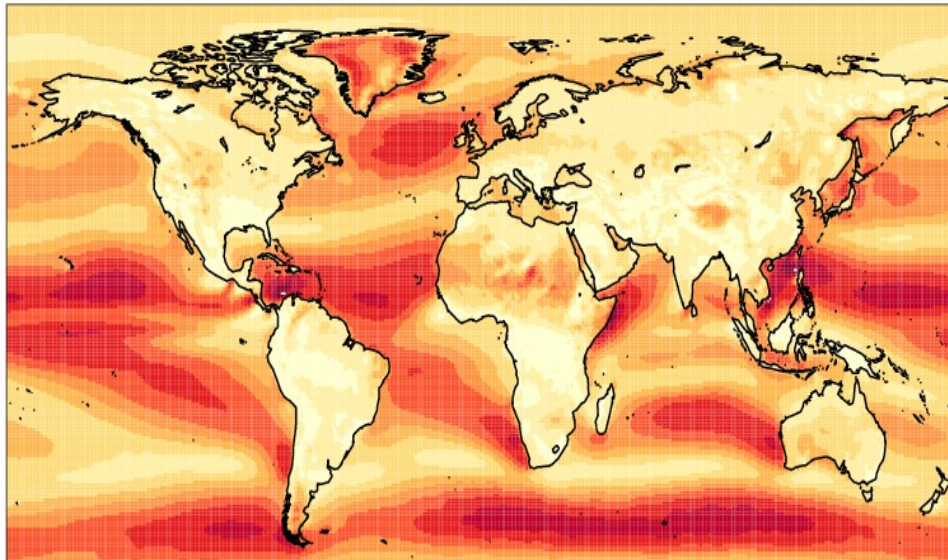
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Outline

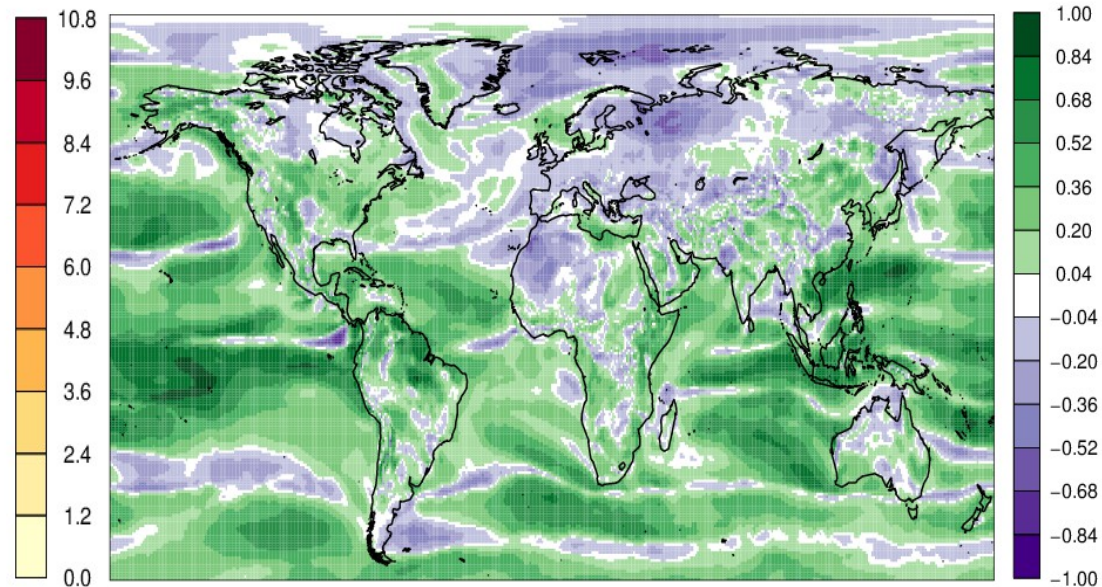
- 1. Make products useful for the end users**
- 2. Simple and understandable visualisations for specific regions**
- 3. Produce wind power-density predictions**
 - Bias corrected hindcast
 - Calibrated hindcast
 - Projection of hindcast over impact surfaces

1. Product and validation

**ENSEMBLE MEAN of 10m Wind Speed.
Winter, ECMWF S4, 1month lead time from 2011**



**CORRELATION SKILL of 10m Wind Speed.
Winter, ECMWF S4, 1month lead time and ERA-
INTERIM from 1981-2010**

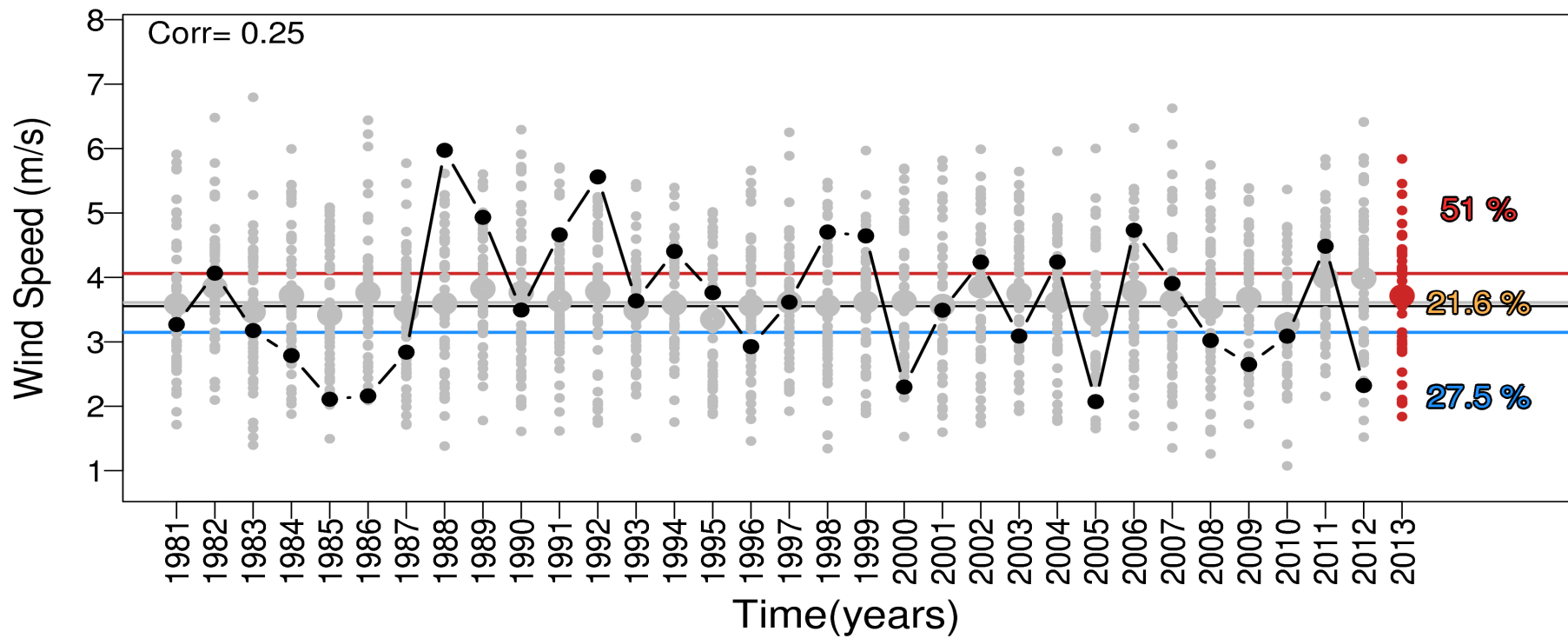


2. Visualisation example

NORTH SEA.

10m Wind Speed.

Winter, ECMWF S4, 1month lead time from 1981 to 2013



■ Observations

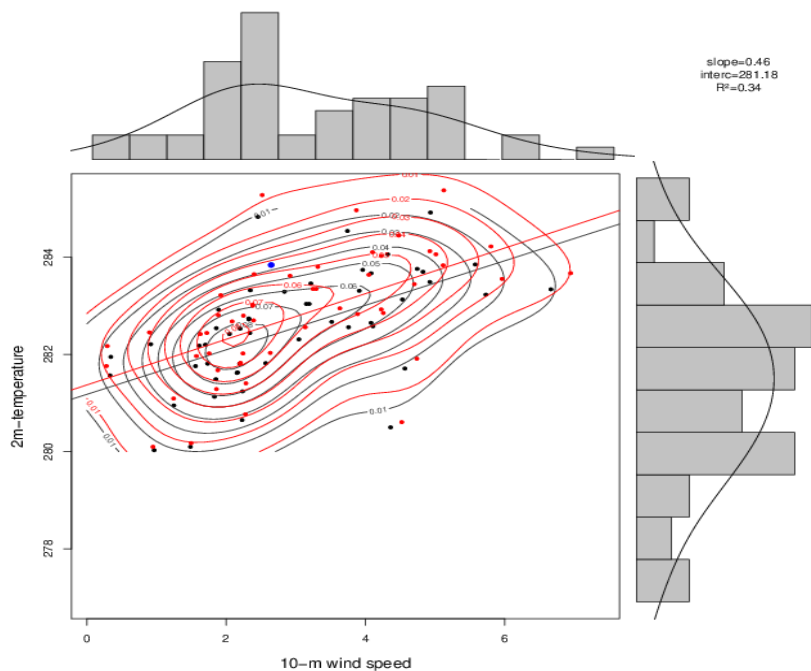
■ Hindcasts

■ Forecast

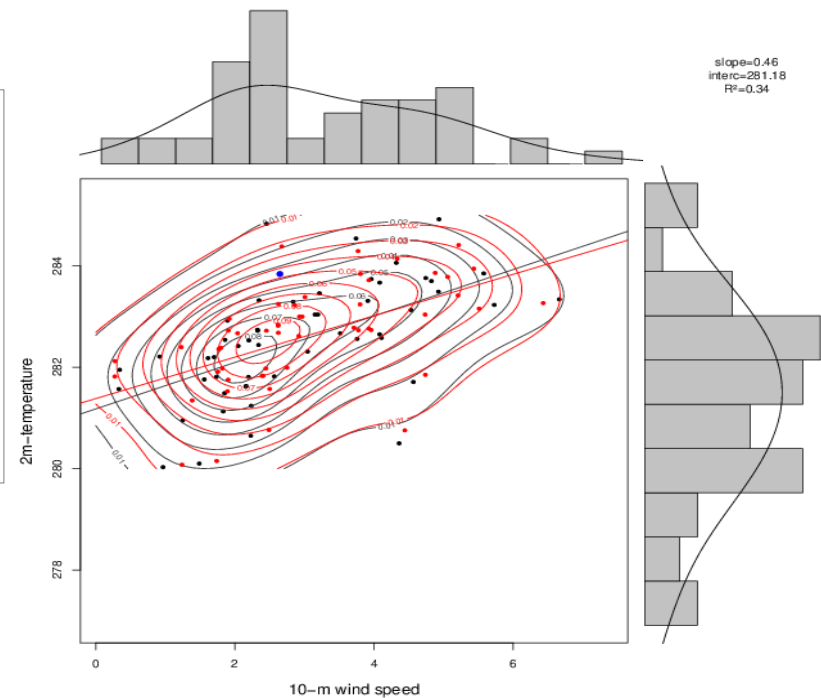
3. Bias correction

LONDON. Scatter-plots with marginal distributions
10m Wind Speed and 2m Temperature
November, ECMWF S4, 0 month lead time, 2011

Method 1: Simple



Method 2: Percentile Matching



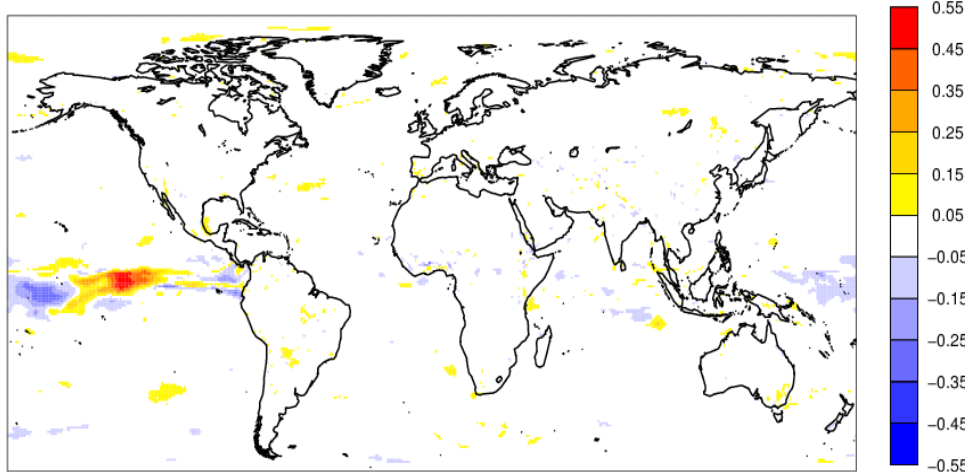
- The simple method moves the mean but the slope is equal.
- The percentile matching method change the slope of T against WS because this method is a non-linear operation.

3. Bias correction

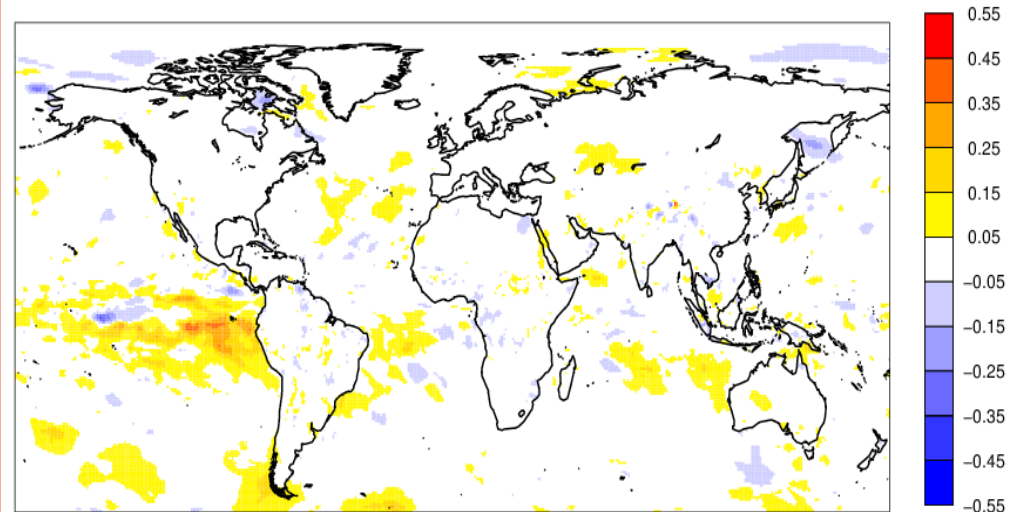
10m wind Speed and 2m Temperature
November, ECMWF S4, 0 month lead time, 1981-2010

Difference between correlation skill maps
CorrSkillMap(Simple Method)-CorrSkillMap(Percentile Matching)

Wind speed



Temperature



Better correlation skill for the simple method than the percentile matching

Future work

- **Calibration of wind speed and temperature hindcasts**
- **Impact surfaces for wind power predictions**
- **Extremes (daily data)**
- **Repeat for solar energy and hydro energy**



EUPORIAS Prototype: RESILIENCE semi-operational climate service for energy management